Technical Appendix 1

(**<u>Transportation</u>**)

to

Attachment A

5-Cities Alliance Comment Letter

MEMORANDUM

To: Project Team

From: Jeff Tumlin

Date: June 24, 2015

Subject: DRAFT Nelson\Nygaard analysis of SR 710 N Extension Project

PURPOSE OF THIS MEMORANDUM

This memorandum represents a high-level overview of our analysis of the SR 710 North project, its EIR, and supporting documents. It includes descriptive graphics suitable for public consumption, as well as a running list of questions to submit to Caltrans and its EIR team.

ANALYSIS AND GRAPHICS

Our analysis of the impacts of the SR 710 North Extension Project, as envisioned as a freeway tunnel, yielded various key themes and findings. The themes include the following:

- The tunnel project increases regional vehicle miles traveled (VMT) and CO2 emissions.
- The tunnel benefits only a select few, and only by a small amount.
- Regional traffic is not improved as a result of the tunnel; rather, it shifts congestion around.
- The tunnel makes arterial traffic worse along certain streets in Alhambra and Rosemead.
- Traffic gets significantly worse on various connecting freeways as a result of the tunnel, in part by inducing extra driving.
- The EIR doesn't allow comprehensive analysis of real solutions to the SGV's transportation needs, particularly for transit.

More detail on each finding is presented in the following sections.

Increased VMT and CO2 emissions

As shown detailed in the Transportation Technical Report, all the tunnel alternatives result in an increase in actual and per capita VMT beyond the no-build scenario.[1] Figure 1 compares localized 2035 VMT in the project study area across various project scenarios, including no-build and various freeway tunnel alternatives. As shown, total VMT increases under all tunnel alternatives,

[1] See Transportation Technical Report, SR 710 North Study, Table 4-8, pg 4-15

by as many 460,000 miles per day. Per capital VMT also increases with all freeway tunnel alternatives.

Figure 1 Study Area VMT: No Build and Freeway Tunnel Alternatives

	No Build (2035)	Freeway Tunnel Alt. (2035)	
		Low	High
Daily Study Area VMT per Day	25,120,000	25,300,000	25,580,000
Study Area Population	1,330,000	1,330,000	1,330,000
Study Area per capita VMT per Day	18.89	19.02	19.23
Estimated Increase in Total Daily VMT Compared to No-Build[2]	-	180,000	460,000
Increase in per capita Daily VMT Compared to No-Build	-	+1%	+2%

As a general rule of thumb, up to 975 hourly vehicles in each direction of travel can be accommodated per through lane along a typical roadway.[3] Using this assumption, the increase in daily VMT caused by the freeway tunnel alternatives would necessitate between approximately 15 and 39 highway or lane miles to accommodate this increase in vehicle miles traveled.

The Southern California Association of Governments' 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy outlines the region's transportation future, including targets for VMT and greenhouse gas emissions. As detailed in the California Air Resources Board analysis of the plan, it sets a goal for a 10.8% reduction in per capita VMT across the region, down from 22.5 miles per day per capita, to 20.3 in 2035.[4] Figure 2 compares 2035 regional per capita VMT for (1) the approved regional Sustainable Communities Strategy, (2) the no build scenario as analyzed in the SR 710 N project EIR, and (3) various tunnel options. As shown, all analyzed scenarios result in higher daily regional VMT, as well as higher per capita VMT. This raises two concerns: (1) the already stated concern that the freeway tunnel alternatives induce increased VMT, and (2) that the SR 710 N project EIR is not consistent with the assumptions and targets of the regional SCS and its full implementation. The latter concern represents a key question to ask Caltrans and its EIR consultant during the public comment period. While the EIR concludes the tunnel option is consistent with the RTP, it does so merely because it is included in the RTP as a future project. Conversely, the EIR fails to adequately analyze the Project's consistency with the RTP/SCS because it increases VMT and, as a result, GHG emissions.

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[2] The EIR's analysis does not state how VMT is calculated, and no details about modeling have been provided, despite repeated requests. So we have estimated VMT difference as follows:

975 = hourly lane capacity

11700 = lane capacity over 12-hour period (for argument's sake)

180,000 / 11,700 = 15.4

460,000 / 11,700 = 39.3

[3] Volumes beyond this saturation point lead to various amounts of congestion and delay.

[4] Technical Evaluation of the Greenhouse Gas Emissions Reduction Quantification for the Southern California Association of Governments' SB 375 Sustainable Communities Strategy. California Air Resources Board (May 2012). http://www.arb.ca.gov/cc/sb375/scag_scs_tech_eval0512.pdf

Emissions impacts are of particular concern given new State goals for emissions reductions instituted by Governor Schwarzenegger and strengthened by Governor Brown, including 40% reductions over 1990 levels by 2030, and 80% over 1990 levels by 2050.[5] The EIR actually shows a slight decrease in greenhouse gas emissions in the study area (see tables 4.9 and 4.10 on page 4-100) across some tunnel alternatives, but does not reconcile this finding with the large increases in VMT as a result of the tunnel alternatives.

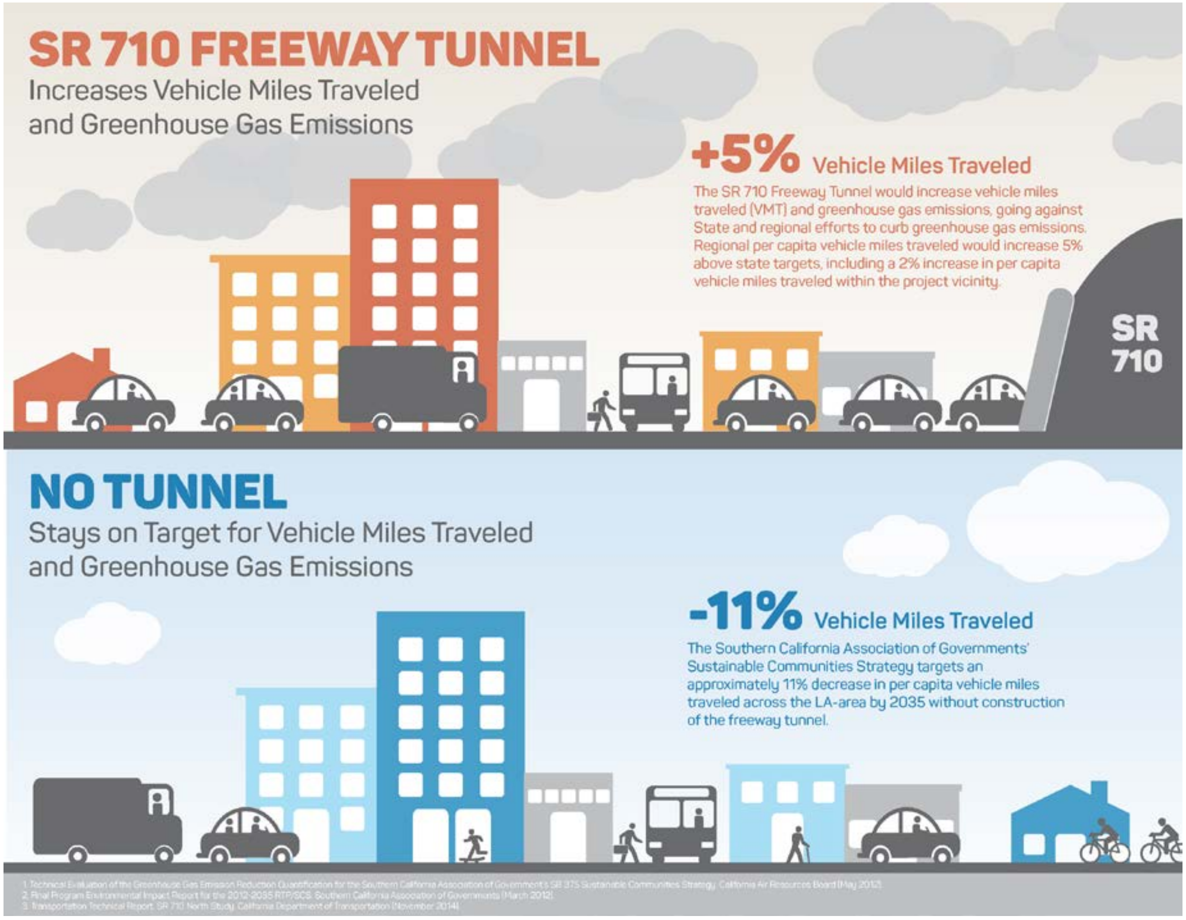
Figure 2 Horizon Year (2035) Change in VMT (No Build and Freeway Tunnel Alternative)

	SCS Target	No Build (2035)	Freeway Tunnel Alt. (2035)	
			Low	High
Daily Regional VMT	449,934,000	471,435,000	471,530,000	471,950,000
Population	22,091,000	22,091,000	22,091,000	22,091,000
Per capita VMT	20.37	21.34	21.34	21.36
Increase in Total VMT Compared to SCS target	-	21,501,000	21,596,000	22,016,000
Increase in Total Daily VMT Compared to No Build	-	-	95,000	515,000

In sum, the freeway tunnel alternatives unilaterally result in increased VMT, directly contradicting State and regional efforts to reduce greenhouse gas emissions. These VMT increases also likely do not take into account true induced demand of the project, since the EIR does not state the assumptions that were used to calculate induced demand. In other words, as more freeway lane miles and alternative routes are introduced, driving becomes a more convenient option. This serves to induce more vehicle trips from people who otherwise would not have traveled via car or made that trip altogether. Figure 3 includes a stylized infographic covering the VMT impacts of the freeway tunnel alternatives.

[5] http://www.nytimes.com/2015/04/30/us/california-governor-orders-new-target-for-emissions-cuts.html

Figure 3 Infographic of Tunnel Alternative VMT Impacts



Minimal Benefits

Supporters of the tunnel project often cite its ability to shift long distance cut-through traffic off of existing arterials in the study area and onto the regional highway network. According to the Transportation Technical report and as shown in Figure 4, only 13.7% of current peak period traffic on study area arterials represents "cut-through traffic," defined to include motorists driving between adjacent cities. By providing a new freeway link, the tunnel alternatives reduce this cut-through share from 13.7% to between 7.3% and 10.6%, which represents a rather small reduction given the high project costs (~$5.5 billion).

By reducing this cut-through traffic, approximately 7% to 13% of all motorists throughout the study area will receive a rather small travel time savings of 2.5 minutes or better, mostly those motorists using the new tunnel itself to travel significant distances. This means that approximately 87-93% of motorists in the study will get no significant travel time savings, or their travel time will be worse as a result of the project.

Figure 4 2035 Cut-Through Traffic and Improved Travel Time[6]

		Freeway Tunnel Alt. (2035)	
	No Build (2035)	Low	High
PM Peak Period Percent Cut-Through Traffic Using Arterials in Study Area	13.7%	7.3%	10.6%
Percent AM and PM Peak Period trips more than 2.5 minutes faster than No Build	-	7.0%	13.0%

Freeway Traffic Doesn't Get Better: It Shifts Around

In analyzing projected 2035 traffic patterns under the No-Build and tunnel alternatives, it is clear that the overall performance of the freeway network does not improve as a result of the project; traffic is merely shifted around from various freeway segments (such as I-605 and SR-2) to others (I-5, I-10, I-210, and I-710). Some of the freeway segments that see increased congestion, such as I-5, are those that are already operating at stressed levels (LOS F) during peak periods. With all tunnel options, congestion on most freeways stays about the same. The only significant benefits are various reductions in congestion on I-605 and SR-2. Figure 5 and Figure 6 map the change in AM and PM peak period congestion, respectively, comparing the No-Build alternative to the Dual-Bore tunnel alternative. Figure 7 displays the exact congestion impacts, potential improvements to alleviate these impacts, and whether or not the improvements are recommended for implementation.

The traffic analysis for the tunnel project suggests the following effects:

- By connecting the 710 to the 210, the tunnel options succeed in shifting a significant amount of traffic off the 605 and onto the 710 and 210, as well as inducing new north-south driving. Traffic increases by about 1,350 vehicles in the peak hour on the 710 south of the 10, and about 2,600 vehicles per hour north of the 10. Traffic on the 210 increases by about 380 vehicles per hour through La Canada Flintridge, and by about 400 vehicles per hour through Pasadena.
- The significant increase in congestion on the 210 means that many drivers would avoid using the Glendale Freeway, and instead stay on the 5, exacerbating existing traffic congestion on the 5.
- The project results in significant induced north-south travel demand, adding traffic to both the 5 and 210 freeways. Where those freeways join, in the bottleneck south of the Highway 14 split, there would likely be a significant increase in traffic congestion, with an additional 650 vehicle in the peak hour. While the project would result in significant increases in congestion in this segment, the EIR does not analyze the impact.

[6] See Transportation Technical Report, SR 710 North Study, Table 4-9, pg 4-18

Figure 5 2035 Change in AM Peak Period Congestion (Build vs. No Build Alternatives)

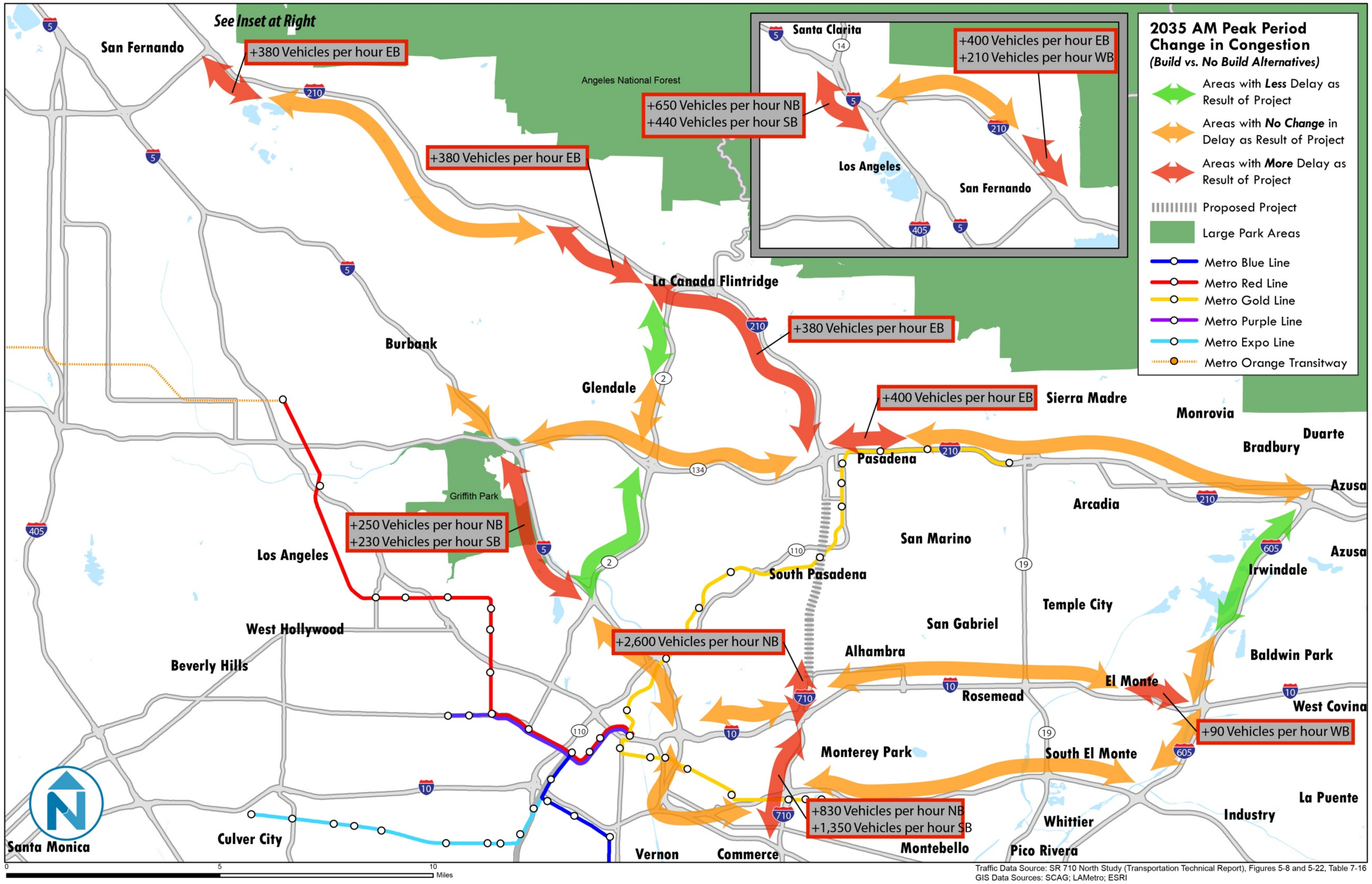
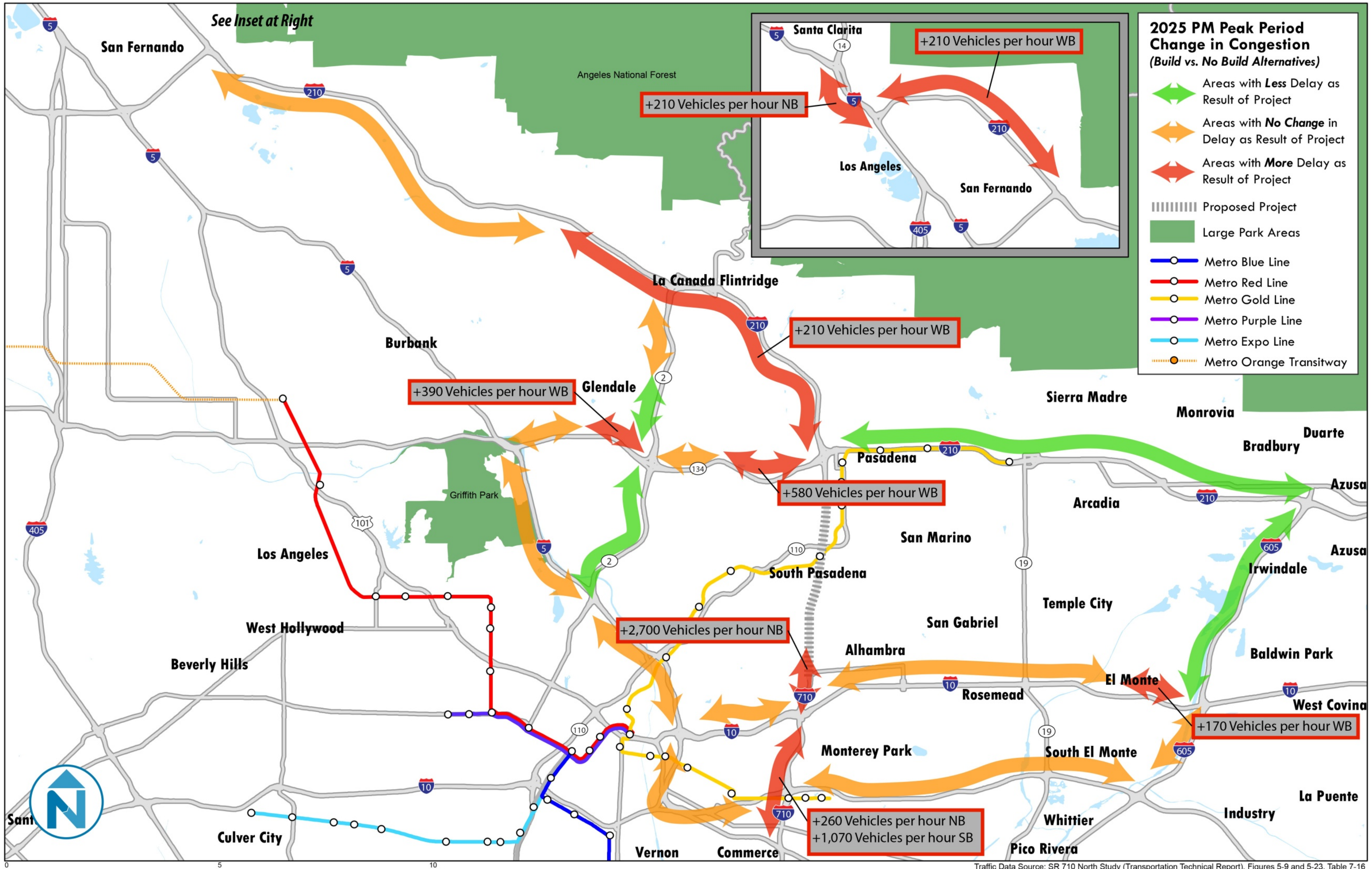


Figure 6 2035 Change in PM Peak Period Congestion (Build vs. No Build Alternatives)



Traffic Data Source: SR 710 North Study (Transportation Technical Report), Figures 5-9 and 5-23, Table 7-16
GIS Data Sources: SCAG; LAMetro; ESRI

Figure 7 2035 Traffic Impact and Potential Mitigation by Freeway Segment (Build vs. No Build Alternatives)

Freeway	Freeway Segment	Impact	Potential Mitigation	Recommended for Implementation?
I-10	I-10 westbound between the SB I-605 on-ramp and the Garvey Avenue/Durfee Avenue off-ramp	AM: +90 VPH (LOS F to E) PM: +170 VPH (LOS F to F)	Active Traffic and Demand Management	Yes
SR 134	SR 134 westbound between the Linda Vista Avenue /San Rafael Avenue on-ramp and the Figueroa/Colorado off-ramp	PM: +580 VPH (LOS E to F)	Add an auxiliary lane between the San Rafael Avenue on-ramp and the Figueroa Street off-ramp	No
	SR 134 westbound between the SB SR 2 on-ramp and the Glendale Avenue off-ramp	PM: +390 VPH (LOS F to F)	Add a lane starting at the Harvey Drive on-ramp and drop it after the Central Avenue off-ramp	No
	SR 134 westbound between the Glendale Avenue on-ramp and the Brand Boulevard/Central Avenue off-ramp	PM: +480 VPH (LOS D to F)		
I-210	I-210 eastbound between the Polk Street on-ramp and the Hubbard Street off-ramp	AM: +380 VPH (LOS F to F)	Add a lane between the Polk Street on-ramp and the Paxton Street off-ramp	No
	I-210 eastbound between the Hubbard Street off-ramp and the Hubbard Street on-ramp	AM: +390 VPH (LOS E to F)		
	I-210 eastbound between the Hubbard Street on-ramp and the Maclay Avenue off-ramp	AM: +360 VPH (LOS F to F)		
	I-210 eastbound between the Maclay Avenue off-ramp and the Maclay Avenue on-ramp	AM: +400 VPH (LOS F to F)		
	I-210 eastbound between the Maclay Avenue on-ramp and the WB SR118 off-ramp	AM: +390 VPH (LOS F to F)		
	I-210 eastbound between the Pennsylvania Avenue off-ramp and the Pennsylvania Avenue on-ramp	AM: +380 VPH (LOS F to F)	Add a lane between the Pennsylvania Avenue off-ramp and the Ocean view Boulevard off-ramp	No
	I-210 eastbound between the Pennsylvania Avenue on-ramp and the La Crescenta Avenue on-ramp	AM: +380 VPH (LOS F to F)		
	I-210 eastbound between the La Crescenta Avenue on-ramp and the Ocean View Boulevard off-ramp	AM: +380 VPH (LOS F to F)		
	I-210 eastbound between the Lake Avenue on-ramp and the Marengo Avenue off-ramp	AM: +400 VPH (LOS F to F)	Add an auxiliary lane between the Lake Avenue on-ramp and the Marengo Avenue off-ramp, add one lane to the Lake Avenue on-ramp and the Marengo Avenue off-ramp	No
	I-210 westbound between the EB SR 118 on-ramp and the Maclay Avenue off-ramp	PM: +210 VPH (LOS F to F)	Active Traffic and Demand Management	Yes
	I-210 westbound between the Maclay Avenue off-ramp and the Maclay Avenue on-ramp	PM: +210 VPH (LOS E to F)		
	I-210 westbound between the Maclay Avenue on-ramp and the Hubbard off-ramp	PM: +210 VPH (LOS F to F)		
	I-210 westbound between the Hubbard Street on-ramp and the Polk Street off-ramp	PM: +210 VPH (LOS E to F)		
I-5	I-5 northbound between the SR 2 NB off-ramp and the SR 2 SB offramp	AM: +250 VPH (LOS F to F)	Active Traffic and Demand Management	Yes
	I-5 northbound between the SR 2 SB off-ramp and the SR 2 on-ramp	AM: +250 VPH (LOS F to F)		
	I-5 southbound between the Stadium Way off-ramp and the SR 2 on-ramp	AM: +230 VPH (LOS E to F)		
I-710	I-710 northbound between the Olympic Boulevard on-ramp and the SR 60 off-ramp	PM: +260 VPH (LOS F to F)	Active Traffic and Demand Management	Yes
	I-710 northbound between the Cesar Chavez Avenue on-ramp and the Ramona Boulevard offramp	AM: +760 VPH (LOS F to F)	Add a lane between the Cesar Chavez Avenue on-ramp and the I-10 off-ramp	No
	I-710 northbound between the Ramona Boulevard off-ramp and the I-10 off-ramp	AM: +830 VPH (LOS F to F)		
	I-710 northbound between the I-10 off-ramp and the EB I-10 on-ramp	AM: +2,600 VPH (LOS C to E) PM: +2,700 VPH (LOS B to E)	Add a lane between the I-10 off-ramp and the EB I-10 on-ramp	No
	I-710 southbound between the EB I-10/Ramona Boulevard on-ramp and the Cesar Chavez Avenue offramp	AM: +1,350 VPH (LOS E to F) PM: +570 VPH (LOS F to F)	Add a lane between the Ramona Boulevard on-ramp to the SR 60 off-ramp	No
	I-710 southbound between the Cesar Chavez Avenue off-ramp and the SR 60 off-ramp	AM: +1,140 VPH (LOS D to F) PM: +440 VPH (LOS F to F)		
	I-710 southbound between the SR 60 off-ramp and the Cesar Chavez Avenue on-ramp	PM: +1,070 VPH (LOS E to F)	Add a deceleration lane for the SR 60 off-ramp and add a lane between the SR 60 off-ramp and the Cesar Chavez Avenue on-ramp	No
	I-710 southbound between the Cesar Chavez Avenue on-ramp and the Third Street on-ramp	PM: +960 VPH (LOS F to F)	Add a lane starting at the Cesar Chavez Avenue on-ramp and drop it before the SR 60 on-ramp	No

Freeway	Freeway Segment	Impact	Potential Mitigation	Recommended for Implementation?
	I-710 southbound between the Third Street off-ramp and the SR 60 on-ramp	PM: +880 VPH (LOS E to F)	Add a lane between the Third Street off-ramp and the SR 60 on-ramp	No
	I-710 southbound between the SR 60 on-ramp and the Whittier Boulevard /Olympic Boulevard off-ramp	AM: +240 VPH (LOS F to F) PM: +220 VPH (LOS F to F)	Active Traffic and Demand Management	Yes
	I-710 southbound between the Whittier Boulevard /Olympic Boulevard on-ramp and the SB I-5 on-ramp	AM: +200 VPH (LOS F to F)		

Source: Table 7-16 of Transportation Technical Report

This lack of improvement in overall freeway traffic congestion forecast with the proposed project is consistent with national research and experience throughout the U.S. In work done for the California Air Resources Board, researchers at the University of California and the University of Southern California reviewed the research literature on induced travel and concluded:

> Thus, the best estimate for the long-run effect of highway capacity on VMT is an elasticity close to 1.0, implying that in congested metropolitan areas, adding new capacity to the existing system of limited-access highways is unlikely to reduce congestion or associated GHG in the long-run. [7]

This conclusion is based on review of a thorough review of 20 research papers on induced travel published between 1997 and 2012. An elasticity of 1.0 between VMT and roadway capacity means that there is no net reduction in congestion. The bottlenecks are simply shifted from one place to another. Here are three real-world documented examples of this process of shifting bottlenecks:

- In the Chicago area, one particularly bad bottleneck on the Eisenhower Expressway, referred to as the "Hillside Strangler," was improved at a cost of $140 million. According to many local sources, the congestion at that particular location improved, but the traffic bottleneck only shifted to adjacent areas. In fact, "the commute time from the suburbs to the Loop, via the Eisenhower and its extension, is one hour - exactly what it was before the Hillside Strangler was repaired."[Daily Herald, October 3, 2002]
- The *Boston Globe* reported that the $15 billion invested by the state and federal taxpayers for the "Big Dig" increased mobility on the expanded roadway. "But most travelers who use the tunnels are still spending time in traffic jams – just not in the heart of the city, where bumper-to-bumper was a way of life on the old elevated artery." The *Globe* documented no apparent overall travel time savings; rather, it reported a number of trips where travel times have increased, including one case where peak period travel time has doubled from 12 minutes to 25 minutes. ."[Boston Globe, November 16, 2008]
- The $1.1 billion I-405 Sepulveda Pass Completion Project was completed in 2014 after 5 years of extensive construction delays. *LA Weekly* reported that the project failed to reduce congestion: "A traffic study by Seattle-based traffic analytics firm Inrix has shown that auto speeds during the afternoon crawl on the northbound 405 are now the same or slightly slower – the maddening 35-minute tangle between the 10 and the 101 is actually a minute longer. More worrisome is the morning southbound logjam. It's so bad, post improvements, that when Caltrans issues its 'worst bottleneck' rankings in August, unofficial data suggest that the 10-mile stretch of the 405 between the Valley and the Westside could be the worst freeway segment in California. [LA Weekly, "$1.1 Billion and Five Years Later , the 405 Congestion Project is a Fail, March 4, 2015]

As discussed above, the EIR modeling indicates that the proposed project would similarly move bottlenecks around rather than truly addressing regional congestion. The travel demand model relied on in the EIR is incapable of properly analyzing these bottlenecks. All of the roadway segments listed in Figure 7 above are forecast in the EIR to operate at Level of Service (LOS) F in 2035. This means that the modeled demand is greater than the traffic volume that can travel across the freeway segments. When demand exceeds supply, accurate analysis as described in the

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[7] Handy, Susan and Marlon G. Boarnet. "Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief" prepared for California Air Resources Board, September 30, 2014.

Highway Capacity Manual requires that the excess volume "spill over into adjacent upstream segments" [8] and be accumulated unless demand drops enough that the bottleneck can clear Anyone who has driven freeways in the Los Angeles region has experienced such spillback. The EIR model does not include spillback but instead assumes that all modeled vehicles will get through the bottleneck.

The importance of this serious model deficiency is demonstrated below using EIR model numbers for I-710 northbound at I-10 (the primary upstream source of northbound tunnel traffic). Figure 8 shows that excess traffic demand totals 16,412 vehicles for the 13-hour weekday period from 6 a.m. to 7 p.m. in the Dual-Bore tunnel alternative. Although the mid-day traffic period is not addressed in the EIR, it actually is the most congested of the three peak model periods. There is an excess of 1304 vehicles per hour – compared to 1099 vehicles per hour in the morning peak period and 1255 vehicles per hour in the afternoon peak period.

Figure 8 2035 Spillback on Northbound I-710 at I-10 Calculated from EIR Model Files for Dua-Bore Tunnel Alternative)

	Capacity[9]	Demand (PCE)[10]	Spillback
AM peak period 6-9	16,200	19,498	3,298
Mid-day period 9-3	32,400	40,223	7,823
PM peak period 3-7	21,600	26,621	5,021
Total (13 hours)	70,200	86,342	16,142

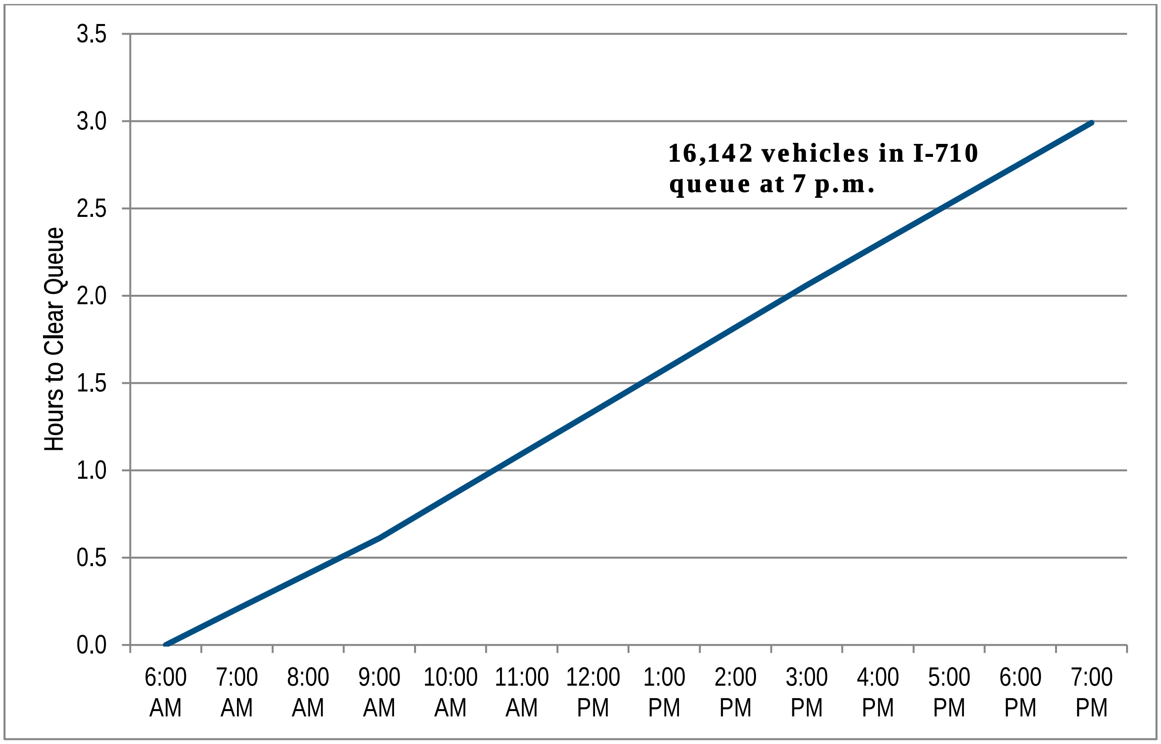
If the EIR traffic demand forecasts were accurate, traffic would begin spilling back at 7 a.m. and the queue would get longer and longer during the day. As shown in Figure 9, at 7 p.m. the queue would reach 3 hours in length. It would take much longer than 3 hours for such a queue to clear because vehicles would continue to arrive after 7 p.m.

[8] Transportation Research Board, *Highway Capacity Manual*, p. 25-12, 2010.

[9] Using 1800 vehicles per lane per hour as used in EIR modeling. Actual capacity can only be measured in the field, but most likely is no more than 2000 vehicles per lane per hour. If capacity was 2000 vehicles per lane per hour, the 13-hour spillback would be 8,342 vehicles.

[10] "PCE" is Passenger Car Equivalents. Trucks count more than 1.0 PCE.

Figure 9 2035 Queue Length behind northbound I-710 at I-10 Calculated from EIR Model Files for Dual-Bore Tunnel Alternative)[11]



This 3-hour+ queue would never actually happen because travelers would adjust their behavior to avoid such an extreme bottleneck. Nevertheless, this is a more accurate portrayal of this roadway section than the pure fantasy that is represented in the EIR model files. In the AM peak period in the No Build alternative, the northbound section of I-710 at I-10 is modeled as the 280th most congested freeway segment in the greater Los Angeles region. In the Dual-Bore tunnel alternative, this section moves up the list 256 places to become the 24th most congested freeway segment in the region. Nevertheless, the model assumes that the increased travel time on this section is only 1 minute relative to the No Build alternative. The actual delay would be many times that long – even if much of the excess demand never materializes.

Relying on this fantasy model leads to erroneous conclusions including:

- Greatly underestimating the increased delays where the project would create new bottlenecks or make existing bottlenecks worse.
- Overestimating tunnel volumes because upstream bottlenecks are not accounted for.
- Overestimating diversion from arterial roadways because the model assumes more throughput at freeway bottlenecks than is possible.
- Miscalculation of air pollution including greenhouse gas emissions.
- Inaccurate estimation of induced travel.

[11] Negative impacts for other Build alternatives vary in degree but not in kind.

The EIR travel demand model would show benefits from added freeway capacity in any location because it treats each roadway section as completely independent. The model cannot account for delays from bottlenecks. Engineers have been playing a very expensive game of "whack-a-mole" and losing. Capacity is expanded at one bottleneck which causes other bottlenecks to worsen and new bottlenecks to appear. Then these other bottlenecks are "whacked" in succession without any reduction in regional congestion. An analysis of congestion across U.S. regions shows that additional freeway capacity actually is positively correlated with increased regional congestion; i.e. more freeway capacity = more congestion.[12]

The EIR estimates for future air pollution and greenhouse gas emissions all are developed on a roadway segment-by-segment basis that assumes that the forecast volumes and speeds are accurate. As demonstrated above, the travel demand model is incapable of properly modeling the extreme roadway bottlenecks forecast for 2040, including bottlenecks that would be made worse by the proposed tunnel. If the forecast traffic volumes were accurate, as discussed above there would be a 3+ hour queue for I-710 at I-10 northbound at the end of the afternoon peak travel period. This would suggest an average delay over a 24-hour period that would be on the order of an hour rather than the roughly 2 minutes estimated in the model. Alternatively, if the forecast speeds were accurate, then future traffic volumes must be much lower than forecast. Either way, the forecast air pollution and greenhouse gas emissions are wrong for all alternatives. Comparing sets of wrong estimates across the alternatives – and drawing conclusions from one number being slightly higher or lower than another – is unwarranted.

Similarly, the travel demand model cannot be trusted to accurately estimate induced travel. The forecast traffic volumes are wrong on a segment-by-segment basis. Therefore, adding up VMT on a segment-by-segment basis also results in numbers that are wrong. The DEIR traffic modeling cannot properly inform the public as to either the intended or unintended consequences of the proposed tunnel.

Even if the travel demand model could be trusted to accurately estimate induced travel, the time period analyzed in the EIR is too short. Because project construction is expected to take approximately five years, and will not begin until after 2015, the EIR's analysis of traffic-related emissions from the Freeway Tunnel alternatives begins in "operational year" 2025 (p. 4-100). However, the EIR analyzes traffic demand only through 2035. This means that it only analyzes traffic-related impacts from the Freeway Tunnel alternatives during a ten year window. This is misleading. As outside research cited in our comment letter shows, during this short-term window congestion may actually be reduced as a result of increased capacity. However, after this period, the purported efficiency gains, if any, can be expected to dissipate as a result of induced demand. Therefore, the EIR should have analyzed and forecasted traffic through 2050. Caltrans may respond that the EMFAC2011 model only forecasts through the year 2035. But this is no excuse to ignore impacts from 2035 to 2050. Even if Caltrans is unable to provide a quantitative analysis of traffic from 2035 to 2050, it should still have provided a qualitative analysis. This is especially true given the current research regarding the long-term (10 + years out) effects of induced demand from increasing capacity.

The I-710 bottleneck used as an illustration is only one the bottlenecks that the proposed project either would create or make worse. The EIR modeling does more to highlight the deficiencies of

[12] Marshall, Norman L. "A Statistical Model of Regional Traffic Congestion in the United States". Submitted for presentation at the 2016 Annual Meeting of the Transportation Research Board.

the underlying model than it does to tell us anything about the real world. It certainly is no basis on which to justify spending billions of dollars.

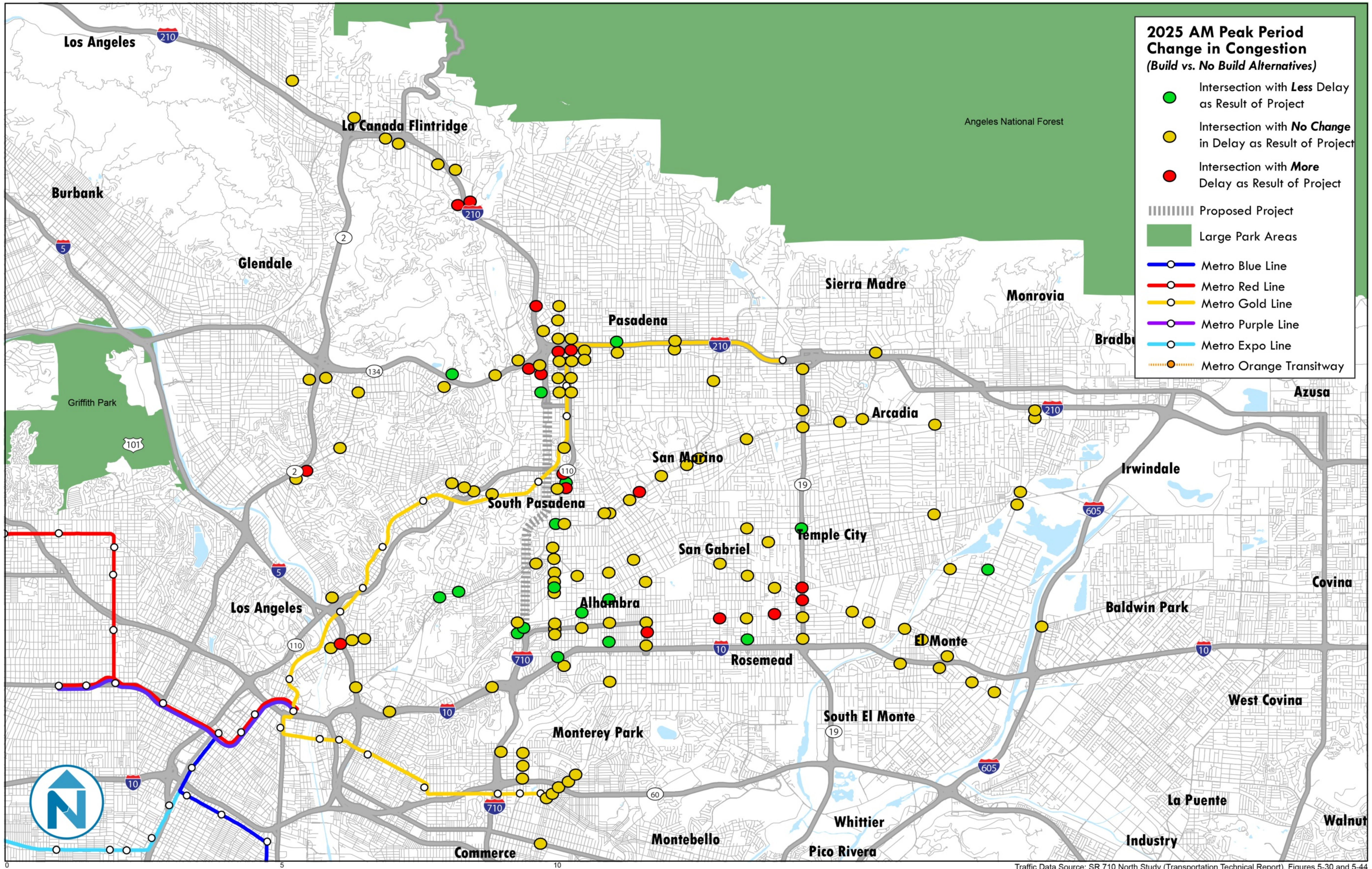
Arterial traffic congestion gets worse in Alhambra and Rosemead

As discussed previously, the freeway tunnel alternatives result in reduced cut-through traffic along some study area arterials. However, the tunnel alternatives also result in increased congestion in certain areas and decreased intersection performance. Figure 10 and Figure 11 compare AM and PM peak period intersection LOS, respectively, for the No-Build and Dual Bore alternatives. While performance improves at some intersections (notably along Huntington Drive, portions of South Fremont Avenue, and portions of East Valley Boulevard), the tunnel options make arterial congestion generally worse in parts of Alhambra, Rosemead, San Marino, Pasadena, and South Pasadena, particularly on:

- West Valley Boulevard in Rosemead
- South Garfield Avenue in Alhambra
- Huntington Drive in San Marino
- Fair Oaks Avenue and Fremont Avenue in South Pasadena
- Rosemead Boulevard in Rosemead
- Various intersections in downtown Pasadena

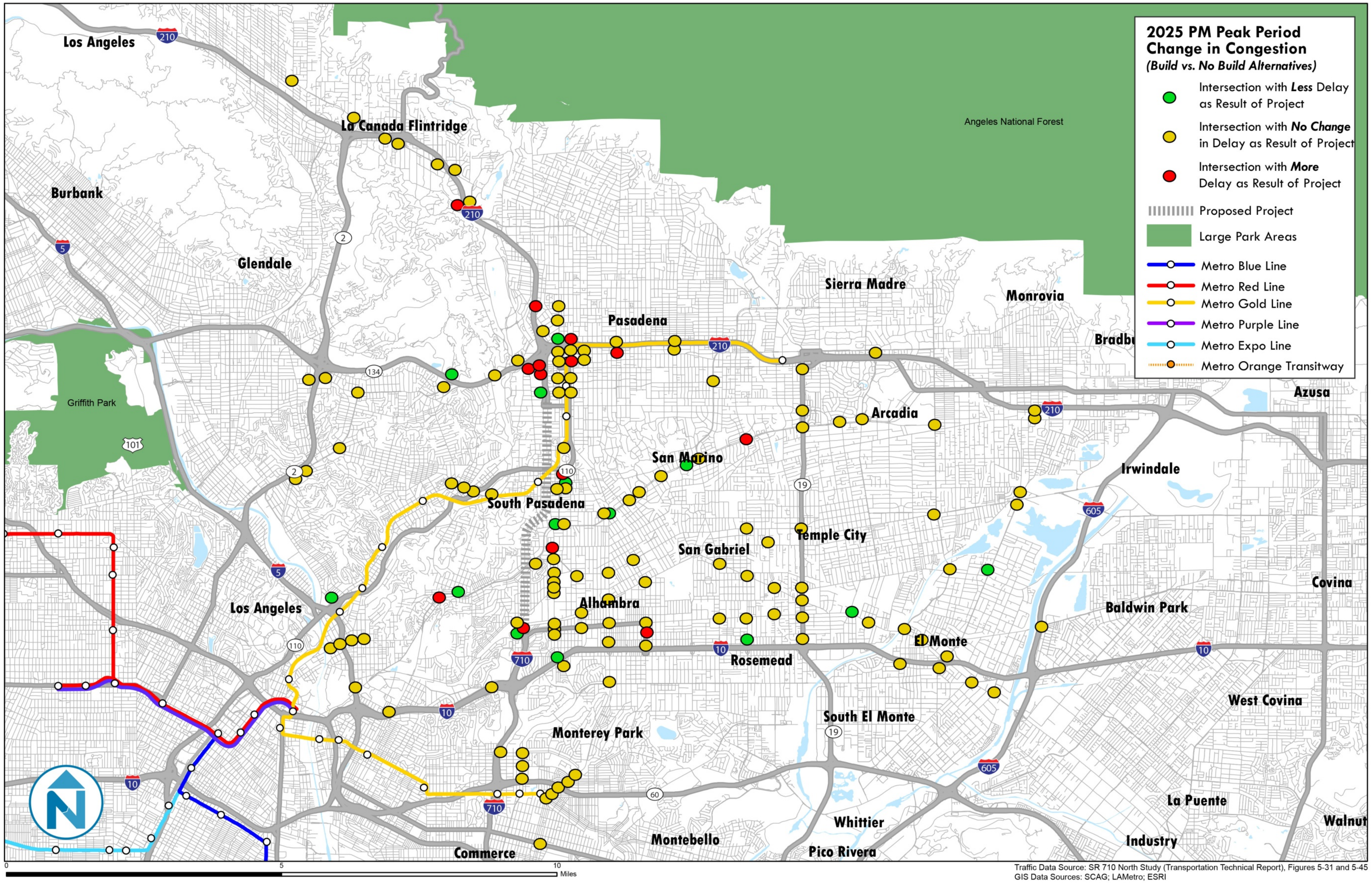
The traffic issues in and around Alhambra seem to be due to the fact that trips to Alhambra from the north and south would get concentrated at the Valley Boulevard ramps rather than filtering through the grid as they do now.

Figure 10 2025 Change in AM Peak Period Level of Service (Build vs. No Build Alternatives)



Traffic Data Source: SR 710 North Study (Transportation Technical Report), Figures 5-30 and 5-44
GIS Data Sources: SCAG; LAMetro; ESRI

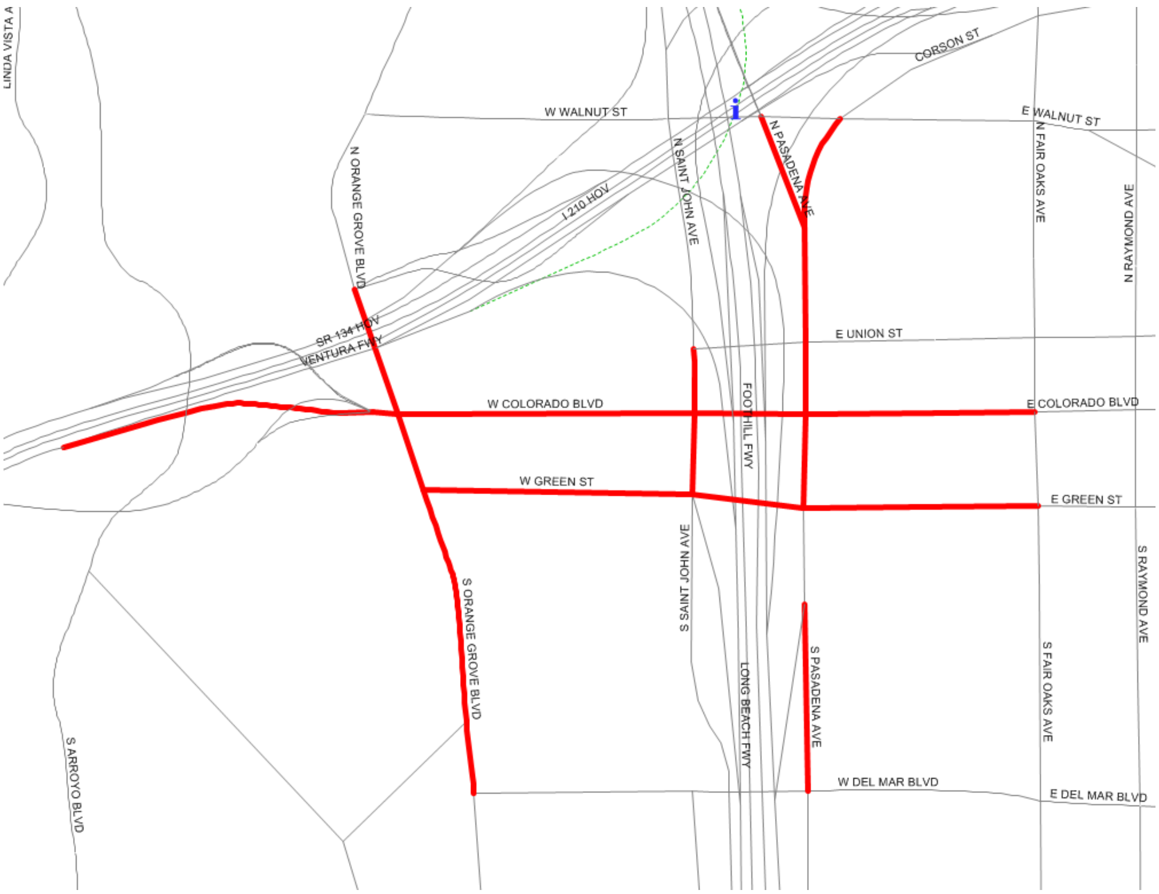
Figure 11 2025 Change in PM Peak Period Level of Service (Build vs. No Build Alternatives)



Arterial traffic congestion gets worse in Pasadena

One of the reasons why expanding freeway capacity is so ineffective at reducing congestion is that freeway expansion increases congestion on the local street network in the vicinity of on-ramps and off-ramps. No trip begins or ends on a freeway. Each vehicle shifted to freeways increases congestion at access points – which often are the most congested points in the non-freeway road network. Figure 12 shows non-freeway roadways in Pasadena where the modeled traffic volume would increase by 5,000 vehicles per day in 2035 with the Dual-Bore tunnel as compared to the No Build alternative.

Figure 12 Pasadena Streets with 5,000 or More Additional Vehicles per Day in 2035 with Dual-Bore Tunnel Alternative

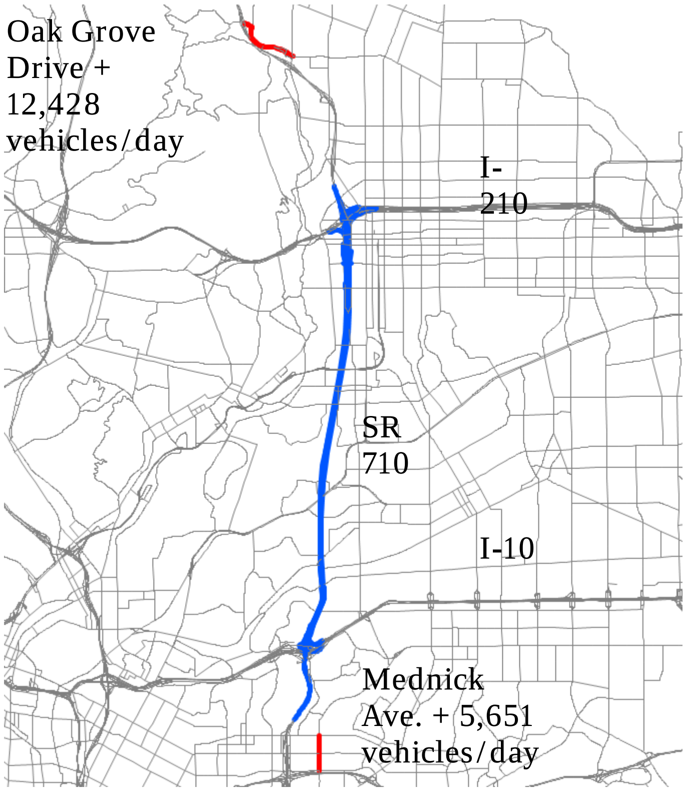


The EIR does not identify these streets or the related intersections as particularly congested in 2035. However, as discussed above, the underlying transportation model is incapable of assigning traffic volumes accurately because it cannot account for the effects of bottlenecks. Therefore, the highly detailed intersection level-of-service analyses in the EIR that purport to estimate intersection delay in 2035 to a tenth of a second are not credible. All that can be hoped from the model is a general indication of areas where traffic volumes are likely to increase or decrease. More accuracy than that would require a very different type of model. The increased traffic shown for local streets in Pasadena are likely impacts of the proposed project. The severity of these impacts are unknown.

Arterial traffic congestion gets worse at considerable distance from proposed tunnel

The traffic impacts of the proposed project extend well beyond its immediate vicinity. Figure 13 illustrates two of these locations.

Figure 13 2025 Change in PM Peak Period Level of Service (Build vs. No Build Alternatives



North of the proposed project, increased traffic volume and congestion on I-710 would shift traffic to parallel arterials. As shown in Figure 13, the EIR modeling shows 12,428 more vehicles per day on Oak Grove Drive in the Dual-Bore alternative than in the No Build alternative. To the south of the proposed tunnel, the EIR modeling shows an increase of 5,651 vehicles per day on Mednick Avenue in the Dual-Bore alternative as compared to the No Build alternative. These sorts of shifts of traffic to arterials could create a need for arterial capacity enhancements – extending the "whack-a-mole" problem discussed above beyond the freeways to the entire regional roadway system.

Traffic gets a lot worse on the 210, 710, and the 5

The tunnel projects makes congestion significantly worse on the 210 from 710 to I-5, and worse on the 710 south of the 10. There are minor improvements on the north end of the 605 and on 210 east of 710. What happens to the 5 when all this new 210 traffic is dumped on it where the 5 and 210 merge? Or on the congested portions of the 710 south of SR 60? These impacts are not analyzed.

The EIR doesn't allow real solutions to the SGV's transportation needs

On page 1-53, the "Independent Utility and Logical Termini" section describes why, given the highway-focused study area boundaries, it is not allowable to develop a systematic solution to the San Gabriel Valley's transportation needs. Because the project's purpose and need statement focuses only on north-south travel, and because the corridor of focus stretches from the 10/710 to the 210/134 interchanges, it is not possible to examine comprehensive approaches, particularly for transit. While downtown Pasadena may be a logical transit destination, there are key transit destinations south of the 1o that cannot be considered under this constrained purpose and need. Moreover, east-west options are ignored, even if they would create significant benefit for the congested arterials intersections of concern.

Even if only a north-south transit option were considered, the logical option would be to build upon Metro's existing plans for BRT on Atlantic, and existing plans to upgrade the 762. This improved service should connect to Cal State LA and East LA College. It should also be extended to the Long Beach Blvd Green Line station, with stops in central Lynwood, creating a real transit network for the underserved 710 corridor. See more detail in our draft Mobility Plan.

Most traffic isn't long distance

According to Table 5-2 of the Transportation Technical Appendices, about 40% of study area residents work in the study area, and over 90% work in LA County. Similarly, 90% of Study Area employees live in LA County. About 60% of non-work trips in the Study Area start and end there.

However, construction of the proposed project would funnel long-distance regional traffic through the study area as illustrated in Figure 14. Higher regional VMT results from a combination of traveler choosing more distant destinations with the project, and less direct routing with the project.

Figure 14 2035 Mid-Day (9 AM – 3 PM) Traffic Using the Proposed Project (Dual-Bore Alternative)[13]

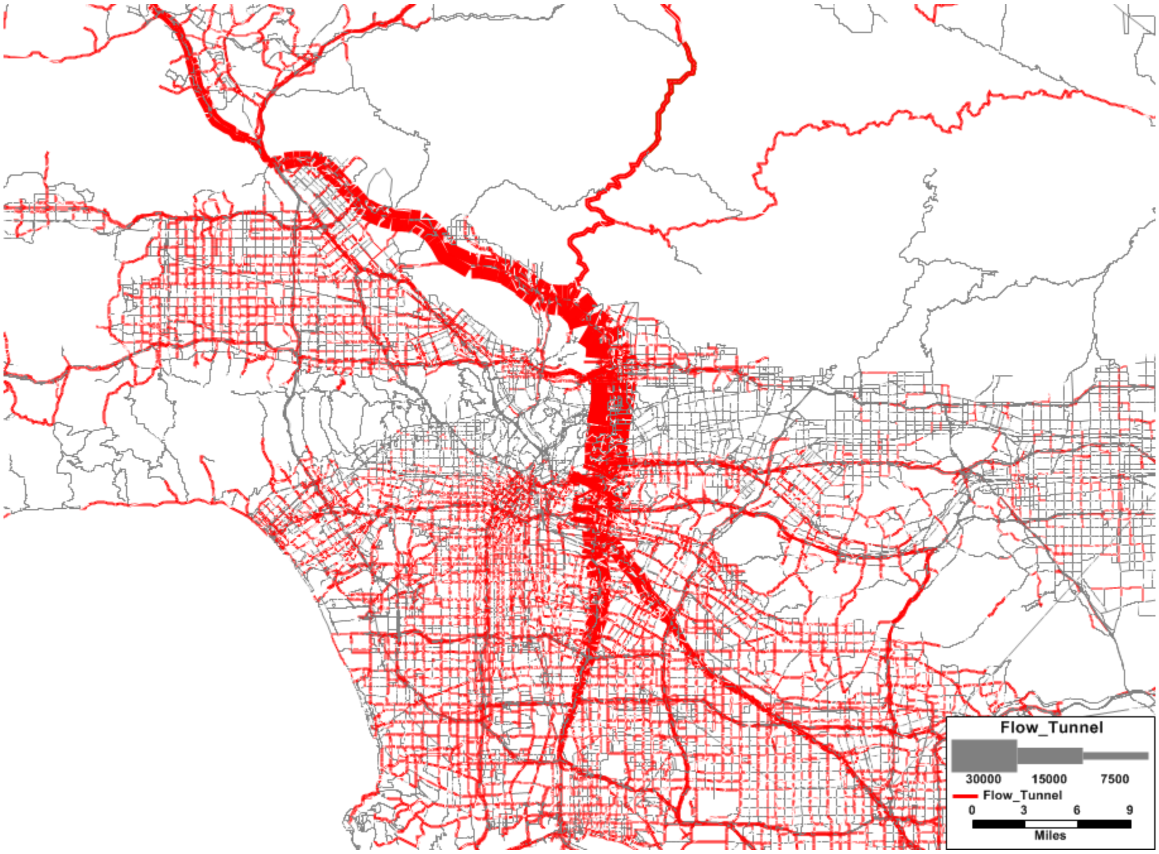


Figure 14 any link colored red has modeled traffic using the tunnel. As shown, this includes trips to and from areas well to the northwest where there are more direct routes. The width of the lines is proportional to the volume of traffic. South of the tunnel, tunnel traffic is dispersed widely. To the north there is somewhat more concentration. About 20 percent of the traffic is to and from areas to the north of the I-5/I-210 merge.

[13] EIR TransCAD trip table assigned to EIR TransCAD network using TransCAD

QUESTIONS FOR EIR TEAM

Given our analysis of the project EIR and supporting documents, we have the following questions to submit to Caltrans and its EIR team:

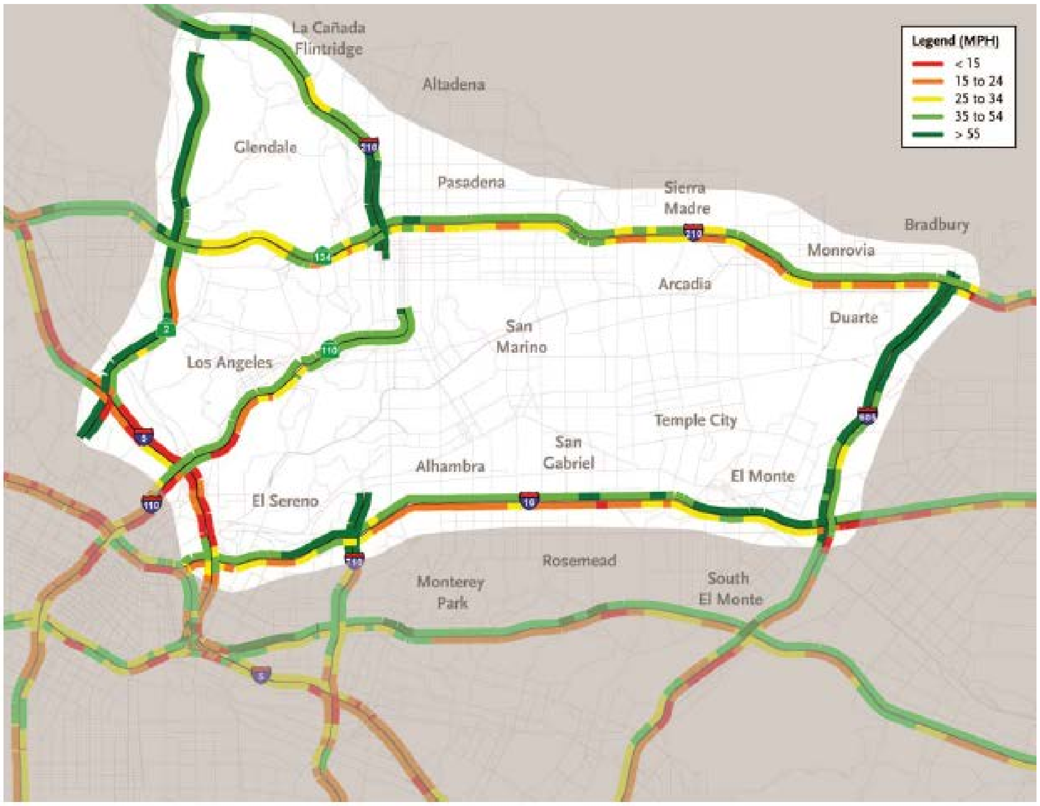
1. How do the analyses of the No-Build and Build alternatives incorporate total and per capita VMT targets in the Southern California Association of Governments' 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy? The EIR does not appear to analyze the Project's consistency with the RTP/SCS, beyond its mere inclusion in the RTP as a future project. Based on our review, the Project would be inconsistent with the RTP/SCS because it increases VMT and therefore GHG emissions.
2. The EIR's tunnel build options do not appear to be consistent with the Caltrans Strategic Management Plan 2015-2020, and particularly the agency's stated goals and performance metrics. How does the project achieve Caltrans' goals and objectives for the state transportation system, particularly the following:

Strategic Objectives	Performance Measures	Targets
PEOPLE: Improve the quality of life for all Californians by providing mobility choice, increasing accessibility to all modes of transportation and creating transportation corridors not only for conveyance of people, goods, and services, but also as livable public spaces.	Percentage increase of non-auto modes for: ▪ Bicycle ▪ Pedestrian ▪ Transit	By 2020, increase non-auto modes: ▪ Triple bicycle; ▪ Double pedestrian; and ▪ Double transit. (2010-12 California Household Travel survey is baseline.)
PLANET: Reduce environmental impacts from the transportation system with emphasis on supporting a statewide reduction of greenhouse gas emissions to achieve 80% below 1990 levels by 2050.	Per capita vehicle miles traveled.	By 2020, achieve 15% reduction (3% per year) of statewide per capita VMT relative to 2010 levels reported by District.
	Percent reduction of transportation system-related air pollution for: ▪ Greenhouse gas (GHG) emissions ▪ Criteria pollutant emissions	▪ 15% reduction (from 2010 levels) of GHG to achieve 1990 levels by 2020. ▪ 85% reduction (from 2000 levels) in diesel particulate matter emissions statewide by 2020. ▪ 80% reduction (from 2010 levels) in NOx emissions in South Coast Air Basin by 2023.

3. Given our analysis, the tunnel build options seem inconsistent with efforts to implement AB 32. How does the project help meet the California Air Resources Board 3-8% VMT reduction goals necessary to implement AB 32?

4. How is induced demand calculated for the tunnel options? What assumptions were used in estimating induced demand? It is not possible to verify the accuracy of the EIR's transportation analysis because the EIR does not include any background assumptions about induced demand. What little information is provided would indicate that the EIR has substantially underestimated the Project's transportation impacts because it does not appear to take into account all of the induced travel that would result from the Project's increase in capacity. Numerous studies exist showing that adding highway capacity leads to additional vehicle travel, including a report by the California Air Resources Board.[14] Generally, it has been shown that a one-to-one relationship exists between road capacity and vehicle travel. In other words, if capacity is increased by 10%, the amount of driving also increases by 10%.
5. The tunnel projects increase traffic volumes on both the 5 and 210 freeways. It appears that these added traffic volumes join where the 5 and 210 freeways merge. Yet, the EIR does not analyze the congestion impacts of adding significant peak traffic to this key bottleneck. The EIR must disclose how much congestion and delay is created north of the 5/210 merge, and on the 14 freeway.
6. Figure ES-2 shows the travel times to downtown Pasadena from locations within the project study area, "illustrating the lack of continuous north-south transportation facilities." Figure ES-2 more readily identifies a lack of east-west transportation facilities, not north-south. The EIR must explain how this figure supports the need for a north-south project. Moreover, this figure does not appear to have any relationship to actual travel time, but rather modeled travel time using a limited number of corridors. What actual travel time empirically measured?
7. Figure 1-5 purports to show the added travel distance necessary as a result of a missing freeway segment. Why should we assume, however, that one should be expected to use a *regional* freeway to travel between adjacent cities? Similarly, taking the 605 to the 210 to get from El Monte to Pasadena is only slightly more out of direction than taking the 10 to an extended 710. Measuring in Google, it is 17 miles by way of the 605 and 210, and 17 miles by way of the 10 and 710. Please explain the policy basis for accommodating travel between adjacent cities on a regional freeway.

[14] http://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief-4-21-14.pdf



8. Table 1-9 provides an LOS analysis comparing existing to future year no-build scenarios. The charts assume an ever-increasing amount of auto traffic on streets throughout the study area. Our records, however, show that traffic levels on area streets have remained fairly steady over the last 30 years, despite significant ongoing growth and development in the area. In many cases, traffic counts are lower today than in 1999. Please provide an explanation of why future trends are expected to differ substantially from past trends. Why should we expect traffic to grow with population and jobs, when they have not historically? What is the empirical basis for your traffic projections?

Figure 15 Historic Traffic Counts at Key Area Streets

SR 710 at Del Mar	
2012 Traffic Count:	37,398 (Current Year Estimate)
2010 Traffic Count:	44,500 (Average Annual Daily Traffic)
2009 Traffic Count:	39,500 (Average Annual Daily Traffic)
2005 Traffic Count:	48,500 (Average Annual Daily Traffic)
2004 Traffic Count:	48,000 (Average Annual Daily Traffic)
2003 Traffic Count:	51,000 (Average Annual Daily Traffic)
South Fair Oaks Ave at Glenarm	
2012 Traffic Count:	30,108 (Current Year Estimate)

2003 Traffic Count:	27,860 (Average Daily Traffic)
1996 Traffic Count:	34,121 (Average Daily Traffic)
California Blvd at Magnolia	
2012 Traffic Count:	21,869 (Current Year Estimate)
2004 Traffic Count:	23,414 (Average Daily Traffic)
2002 Traffic Count:	24,349 (Average Daily Traffic)
2001 Traffic Count:	25,892 (Average Daily Traffic)
1996 Traffic Count:	26,000 (MPSI Estimate

9. Table 1.10 shows a steady increase in regional VMT. Is this increase in VMT consistent with the SCS? If not, why not?
10. Table 1.11 confirms that, on study area arterials, there is more congestion in the north-south direction than in the east-west. It also confirms:
    - Both the north-south and east-west arterials are substantially less congested than parallel freeways. Even at peak, the analysis says that the arterials on average have twice as much capacity as needed (V/C < 0.5). This means that arterial congestion is largely a result of bottleneck conditions at specific intersections, not a shortage of corridors.
    - East-west V/C is about 10 percentage points less than north-south corridors.
    - More importantly, the analysis for "All Roadways" concludes that overall, traffic is substantially worse in the east-west direction, rather than north-south.

    Table 1.11 suggests that the project's Purpose and Need is flawed: the study area faces an east-west transportation problem, not a north -south one. An east-west transportation project would likely have a greater congestion relief benefit for the project area cities than a north-south one. Please explain why the east-west transportation needs of the study area have been ignored.

TABLE 1.11:
Volume/Capacity Ratio by Direction of Travel

	All Roadways (PM Peak)		Freeway Only (PM Peak)		Arterials Only (PM Peak)	
	2012	2035	2012	2035	2012	2035
East-West Traffic (e.g., I-10, California Boulevard)	0.62	0.62	0.89	0.88	0.37	0.39
North-South Traffic (e.g., I-5, Rosemead Boulevard)	0.57	0.58	0.84	0.83	0.47	0.49
Difference	*-8.2%*	*-7.7%*	*-5.4%*	*-5.6%*	*24.6%*	*24.5%*

Source: *Transportation Technical Report* (2014).

11. Table 3-2 of the Transportation Technical Report identifies the differences between predictions in the study are travel demand model and actual traffic counts. For arterials in the area, the difference between reality and the model ranges from 9%-26%, with the model predicting 14%-26% less traffic on arterials in the PM peak than actual measurements. The percentage difference between reality and model results appears to significantly exceed any of the potential benefits of the tunnel projects claimed by the

EIR.

TABLE 3-2
Aggregate Highway Model Validation Statistics in Study Area
SR 710 North Study, Los Angeles County, California

Agency Guidance	AM Period	PM Period	ADT
SR 710 North Model – Count to Model Volume Comparison			
Caltrans and FHWA Guidance:			
Freeways +/- 7%	3%	5%	14%
Major Arterials +/- 10%	14%	-14%	14%
Minor Arterials +/- 15%	9%	-26%	4%